

## Chemistry I: Molality problems

Work out the following concentration problems on a **separate sheet of paper**. Show the complete set-up using all necessary conversion factors. Be sure to include the correct unit.

1. Four moles of a solute are dissolved in 2000 g of water. Calculate the molality of the solution obtained.
2. Find the molality of a solution that was made by dissolving 10 moles of a solute in 4000 g of water.

Calculate the molality of the solutions having the following concentrations:

3. 3 moles of solute in 1500 g  $\text{H}_2\text{O}$
4. 2 moles of solute in 5000 g  $\text{H}_2\text{O}$
5. 10.5 moles of solute in 3500 g  $\text{H}_2\text{O}$
6. What is the molality of a solution containing 56 g KOH in 2000 g  $\text{H}_2\text{O}$ ?
7. Find the molality of a solution prepared by dissolving 112 g KOH in 4000 g  $\text{H}_2\text{O}$ .
8. 60 g NaOH in 5000 g  $\text{H}_2\text{O}$
9. 20 g NaOH in 2500 g  $\text{H}_2\text{O}$
10. 30 g acetic acid ( $\text{HC}_2\text{H}_3\text{O}_2$ ) in 2000 g  $\text{H}_2\text{O}$
11. 80 g NaOH in 2000 g  $\text{H}_2\text{O}$ ?
12. 310 g ethylene glycol,  $\text{C}_2\text{H}_4(\text{OH})_2$ , in 2.0 kg  $\text{H}_2\text{O}$ ?
13. 4.6 g glycerol,  $\text{C}_3\text{H}_5(\text{OH})_3$ , in 200 g  $\text{H}_2\text{O}$ ?

How many grams of solute must be dissolved in:

14. 2000 g of  $\text{H}_2\text{O}$  to prepare a 3.00 molal solution of NaOH?
15. 1800 g of  $\text{H}_2\text{O}$  to prepare a 3.00 molal solution of  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$  (MW = 342g)?
16. 500 g of  $\text{H}_2\text{O}$  to prepare a 3.0 molal solution of KOH?
17. What is the molality of a solution containing 31 g ethylene glycol in 2.0 kg  $\text{H}_2\text{O}$ ?
18. How many grams of ethanol (ethyl alcohol) must be dissolved in 1.0 kg of  $\text{H}_2\text{O}$  to prepare a 0.50 molal solution?
19. A solution is composed of 30 g of NaOH in 500 g  $\text{H}_2\text{O}$ . What is its molality?
20. Calculate the molality of a solution prepared by dissolving 15.0 g acetic acid in 400 g  $\text{H}_2\text{O}$ .